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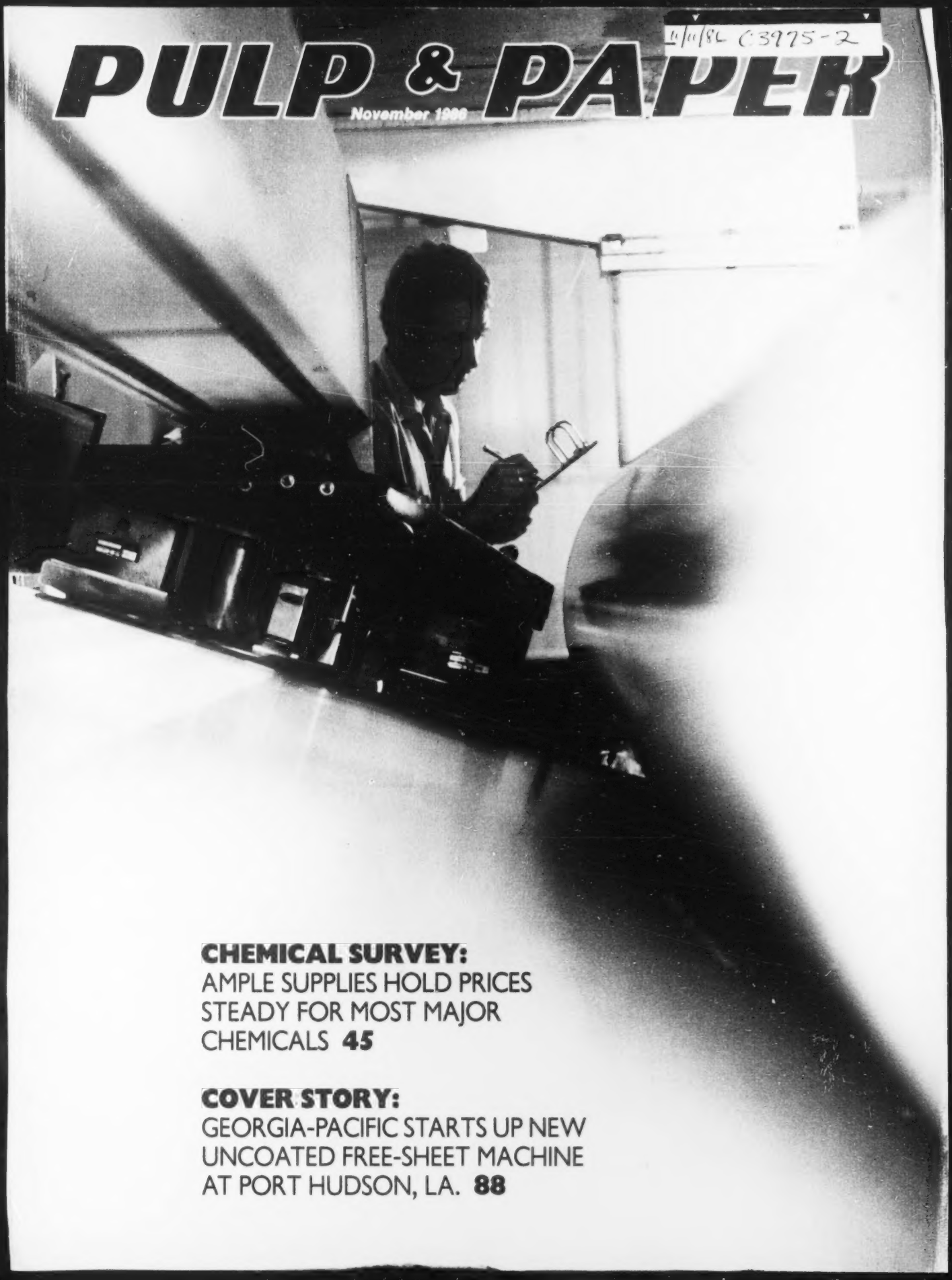
# PULP & PAPER

November 1986



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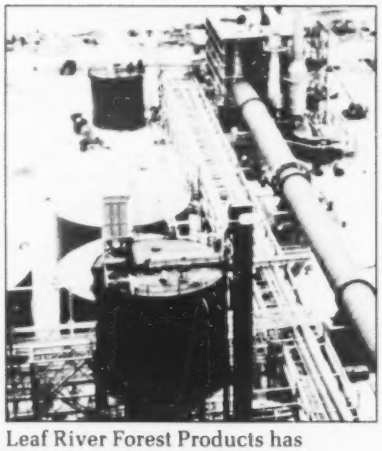

Leaf River Forest Products has successfully installed a three-in-one system to manage its recovery and power boilers as well as the lime kiln

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***Online computer control assures top quality fine paper from Georgia-Pacific's new PM3 at Port Hudson, La. Story begins on p. 38 this issue.*** **(Photo by Jim Robinson, courtesy of Georgia-Pacific.)**

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# NOVEMBER

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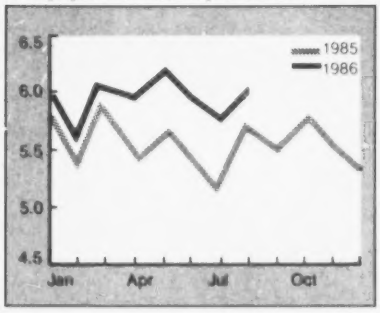
**U.S. paper and board production**




**U.S. production** of paper and paperboard totaled 6.03 million tons in August, up 4.5% from the same month last year, according to American Paper Institute data. Production continued at a record pace about 2.6% above the previous high, set in 1984, and 5.1% higher than last year. The 1986 trend position for the month stood at 70.6 million tpy—the fourth straight month above 70 million tpy. The bulk of the gains are in the paperboard sector, where production is running 7.2% ahead of last year. Paper production is up 3.0% from 1985.

**Among major grades**, containerboard production continued at record levels, with inventories at box plants down 15.3% at the beginning of August and exports of kraft linerboard up 25.6% over last year. Strong demand pushed bleached board up 7.9% and recycled up 7.5% compared with last year. Uncoated free-sheet led the gains in the paper sector, while coated papers continued to recover, rising 14.9% for the month. Tissue and newsprint both continued about 2.6% over last year's levels.

**Canadian newsprint shipments** rose 5.5% in August to 790,000 tons, while pulp exports jumped 12.5%, to 656,000 tons. Operating rates were 93% for both pulp and newsprint. ■

| | Latest month (000 short tons) | | % change from year ago | Annualized year-to-date (000 short tons) | % change from year ago |
|---|---|---|---|---|---|
| **PAPER & PAPERBOARD PRODUCTION[1]** | | | | | |
| Newsprint | Aug. | 486 | 6.6 | 5,632 | 2.7 |
| Uncoated groundwood (s) | Aug. | 126 | −6.0 | 1,495 | 0.5 |
| Coated paper (s) | Aug. | 556 | 14.9 | 6,092 | 0.6 |
| Uncoated free sheet (s) | Aug. | 881 | 6.1 | 10,456 | 8.1 |
| Other printing/writing | Aug. | 115 | 4.5 | 1,379 | 3.1 |
| Total packaging and other paper (s) | Aug. | 422 | −4.1 | 5,134 | −1.1 |
| Tissue | Aug. | 429 | 3.9 | 5,069 | 2.6 |
| **Total paper** | **Aug.** | **2,945** | **2.6** | **35,152** | **3.0** |
| Unbleached kraft paperboard | Aug. | 1,574 | 11.4 | 17,636 | 7.3 |
| Semichemical medium | Aug. | 482 | 6.4 | 5,359 | 5.5 |
| Bleached paperboard | Aug. | 342 | −5.8 | 4,304 | 7.9 |
| Recycled paperboard | Aug. | 687 | 2.1 | 8,159 | 7.5 |
| **Total paperboard** | **Aug.** | **3,086** | **6.3** | **35,458** | **7.2** |
| **Total U.S. paper and paperboard output** | **Aug.** | **6,030** | **4.5** | **70,610** | **5.1** |
| **PULP, WASTEPAPER & FIBER[2]** | | | | | |
| Total U.S. woodpulp production | July | 4,726 | 5.2 | 56,911 | 4.6 |
| Market pulp production | July | 636 | 7.8 | 7,428 | 7.4 |
| Wastepaper consumption at paper/board mills | July | 1,320 | 8.9 | 16,547 | 9.0 |
| Pulpwood consumption (cords) | July | 7,812 | 11.3 | 91,260 | 6.0 |
| **CONVERTED PRODUCTS STATISTICS[3]** | | | | | |
| Corrugated box shipments (billion ft²) | Aug. | 23.726 | 2.4 | 187.608[6] | 5.0 |
| Containerboard inventories at U.S. box plants and mills | Aug. 1 | 2,389 | −15.3 | | |
| **INTERNATIONAL TRADE[2]** | | | | | |
| U.S. paper imports (including products) | July | 1,108 | 25.9 | 11,486 | 3.7 |
| Imports of Canadian newsprint | July | 801 | 25.7 | 8,338[6] | 2.6 |
| U.S. paper exports (including products) | July | 426 | 37.0 | 4,706 | 16.8 |
| Exports of unbleached kraft linerboard | July | 195 | 45.5 | 2,170 | 25.6 |
| Exports of woodpulp | July | 299 | −10.5 | 4,316 | 11.2 |
| Norscan pulp inventories[4] | Aug. 31 | 1,052 | −32.2 | | |
| Norscan pulp operating rates[4] | Aug. | 95% | 94% | 94% | 91% |
| **CANADIAN STATISTICS[5] *(reported in metric tons)*** | | | | | |
| Total newsprint shipments | Aug. | 790 | 5.5 | 6,098[6] | 2.2 |
| Operating rates | Aug. | 93% | 94% | 93% | 92% |
| Inventories held by U.S. consumers | Aug. 31 | 1,439 | −7.9 | | |
| Other paper/board shipments | Aug. | 512 | 6.9 | 3,980 | 9.8 |
| Woodpulp shipments (export only) | Aug. | 656 | 12.5 | 5,175[6] | 12.0 |
| Operating rates | Aug. | 93% | 90% | 93% | 88% |

1. American Paper Institute. 2. API, Bureau of Census, American Pulpwood Assn. 3. Fibre Box Assn., Paperboard Packaging Council. 4. North American/Scandinavian paper-grade market pulp. 5. Canadian Pulp & Paper Assn. 6. Not annualized. (s) = Shipments.

# KRAFT PAPER: Capacity withdrawals and steady demand keep market tight

**Grade structure:** Unbleached kraft paper (UKP) is normally divided into four end uses: bag and sack, shipping sack, wrapping, and other converting. Bag and sack paper is the largest category, accounting for about 60% of total shipments, followed by multiwall shipping sacks, 23%; other converting, 14%; and wrapping, 3%.

Basis weights for bag and sack paper range from 30 lb to 80 lb/3,000 ft², with the lower basis weights being used for small grocery and merchandise bags while 70 lb is most commonly used for grocery carryout sacks. Multiwall shipping sack paper is 50 lb or 60 lb. Extensible or air-dried paper may be used for shipping sacks requiring extra strength.

**Production/capacity:** UKP shipments declined 7.1% to 3.4 million tons last year, reflecting weak demand in many end uses and the permanent shutdown or conversion of five paper machines over the 1984-85 period with a total capacity of more than 500,000 tons.

Shipments this year have held up much better and through August were only running 0.5% below a year ago. Nevertheless, shipments are expected to decline in the fourth quarter due to the shutdown of Champion International Corp.'s 236,000-tpy No. 5 machine at Pensacola, Fla., for conversion to uncoated free-sheet. The company's No. 3 machine at Roanoke Rapids, N.C., was down for several weeks in September for a rebuild that will lift capacity by as much as 90,000 tpy and permit multiwall paper production.

For all of 1986, UKP shipments are expected to decline about 1.6% to 3.35 million tons, resulting in an operating rate of 96%—adjusted for the removal of a 125,000-tpy machine at Jacksonville Kraft Paper Co., which was shut down in late 1985.

Next year UKP shipments are forecast to decline about 2.1%, reflecting some loss of market share to plastic in the grocery bag and sack market as well as reduced U.S. industry capacity. This would result in an operating rate of close to 97%—assuming the Jacksonville mill is reactivated in the second quarter. Consumption of unbleached kraft paper is expected to show a somewhat smaller decline in 1987 because of higher imports from Canada and possibly other countries.

**Market segments:** If unbleached kraft paper prices continue to rise, more capacity could become available on swing linerboard or bleached paper machines. The danger is that UKP could lose more share to plastic film, especially in the grocery market.

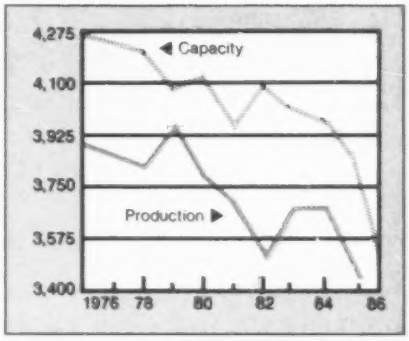
Grocery bag and sack paper shipments declined 6.8% to 2.0 million tons in 1985 but this year will only show about a 1.5% decline. Paper carryout sacks have continued to withstand competition from plastic T-shirt bags mainly because of consumer preference. Paper industry sources estimate plastics market share this year at around 12% to 15% (the plastics industry places its share at 20% to 30%). But a growing price differential between paper and plastic sacks could cause more supermarkets to shift to plastic next year.

Multiwall shipping sack paper volume dropped 9.5% to 795,000 tons last year and will decline about 5% this year, reflecting continued weakness in agriculture markets. Next year shipments are forecast to rise about 2%, with some improvement in the farm economy. Wrapping and other converting demand for multiwall paper dropped 4.3% to 565,000 tons in 1985 but should show only slight dips this year and next.

**Pricing:** UKP paper prices came under heavy discounting pressure in 1985 due to soft demand and low-priced spot tonnage from swing linerboard machines. But prices began to rise sharply this year helped by the capacity withdrawals and the tight linerboard market. In three increases, grocery sack paper (70 lb), for example, rose from a low of $260/ton to around $340 in April and another $30/ton increase was announced for October. A second increase on multiwall paper brought the price of 50 lb to $420 to $430 in September.

Year-end price history for 70-lb grocery sack paper is as follows: 1980, $280; 1981, $300; 1982, $240; 1983, $280; 1984, $330; 1985, $300; 1986 (mid-year) $340. Multiwall sack paper (50 lb): 1980, $375; 1981, $405; 1982, $360; 1983, $380/$410; 1984, $390; 1985, $360; 1986 (mid-year), $390. ■

## SUPPLY/DEMAND (000 tons)




## FORECAST (000 tons)

| | 1985 | 1986e | 1987e |
|---|---|---|---|
| Shipments[1] | 3,403 | 3,350 | 3,280 |
| Capacity[2] | 3,862 | 3,495a | 3,395a |
| Utilization rate | 88.1% | 96.0% | 96.6% |
| Imports[3] | 65 | 105 | 125 |
| Exports[3] | 68 | 75 | 75 |
| Apparent U.S. consumption | 3,400 | 3,380 | 3,330 |
| lb/capita | 28.4 | 28.0 | 27.5 |
| GNP ratio | 0.95 | 0.93 | 0.89 |

e = Estimate. a = Adjusted.
1. American Paper Institute data.
2. Capacity for 1986 adjusted for removal of 125,000-tpy Jacksonville Kraft machine, which is expected to resume produciton by the second quarter of 1987.
3. Dept. of Commerce data.

## TOP U.S. PRODUCERS (000 tpy)

| | Annual capacity | Market share (%) |
|---|---|---|
| **1.** Stone Container[1] | 634 | 18.1 |
| **2.** Georgia-Pacific | 415 | 11.9 |
| **3.** Union Camp | 415 | 11.9 |
| **4.** International Paper | 260* | 7.4 |
| **5.** Longview Fibre | 250* | 7.2 |
| **6.** Champion Intl.[2] | 240 | 6.9 |
| **7.** Gilman Paper | 230* | 6.6 |
| **8.** Westvaco | 150 | 4.3 |
| **9.** Chesapeake | 115 | 3.3 |
| **10.** Mid-America[3] | 110 | 3.2 |

Market share of top five companies: **56.5%**

Market share of top ten companies: **80.6%**

Total U.S. capacity (1986): **3.495 million short tons**

1. Excludes possible purchase of 40% interest in Jacksonville Kraft.
2. Reflects shutdown of Pensacola, Fla., No. 5 machine, rebuild of Roanoke Rapids, N.C., machine.
3. Acquired Weyerhaeuser Co.'s Pine Bluff, Ark., mill in early 1986.
*Excludes bleached packaging paper capacity.

*ENERGY*

## Cogeneration will climb, despite tax reform

Cogeneration capacity of the U.S. pulp and paper industry is now about 7,500 MW, leading U.S. industry with about 35% of the nation's total installed cogeneration capacity. This is expected to increase to 9,000 MW by 1990, according to a survey conducted by the American Paper Institute.

Respondents to the API's survey represent about 88% of the U.S. pulp, paper, and paperboard industry production. About 32% of the industry's cogeneration capacity is located in the southern Atlantic region. The southcentral region is a close second with 30.8%, followed by northcentral at 12.6%, New England at 10.4%, Mountain and Pacific at 9.4%, and the mid-Atlantic region with 4.8%, the API reports.

Spent liquor is the primary fuel of choice for 34% of the industry's cogeneration facilities. About 26.7% use coal, 13.3% use wood, 13.3% use No. 6 oil, and 11.7% use natural gas, according to the API. The amount of electricity sold to utilities by the industry's cogeneration plants almost doubled between 1983 and 1984, increasing from 1,182.7 million kWh to 2,493.2 million kWh over the period (see accompanying table). 1986 promises to set records: 1,023.3 million kWh of electricity, or 9.3% of total in-plant electric generation being sold to utilities during the first quarter.

**PURPA evolves.** Prior to the enactment of the Public Utility Regulatory Policies Act (PURPA) in 1978, pulp and paper companies did not have very much incentive to cogenerate power in excess of their own requirements. PURPA ensured that cogeneration plants would be interconnected to the local utility's grid and required utilities to buy cogenerated power at a fair price. Since PURPA was enacted, the API calculates that the industry has added over 2,100 MW to its cogeneration capacity. API data show that the industry increased its electricity production using cogeneration by 26% between 1982 and 1985. This is expected to increase to 30% in the next five years if PURPA remains unchanged.

The hitch is utilities' reluctance to follow PURPA. It took a ruling by the Supreme Court in 1983 to uphold PURPA in the face of challenges by several utilities. Now states are drafting various laws that curtail PURPA's effectiveness, and there are some indications that the government may reopen the rulemaking on PURPA.

**Tax law regresses.** With the reduction in credits for capital investment under the new tax law, utilities can no longer claim a mill is getting a deal when it builds a cogeneration facility. Cogeneration equipment that is used primarily for producing steam and electricity for onsite consumption, including systems powered by jet engines, internal combustion engines, and combustion turbines not used in combined cycle systems, will be depreciated over 15 years. Cogeneration equipment that is primarily used to take advantage of the sale of electricity to utilities will be depreciated over 20 years. The old tax law permitted all cogeneration equipment to be depreciated over five years.

The new law will eliminate energy tax credits as of Dec. 31, 1985. Those credits that continue because of a contract will be reduced to 65% of their normal value. Electrical and steam transmission and distribution equipment will also be depreciated over 20 years.

**U.S. pulp and paper industry inplant electric generation, including hydroelectric.**

| Year | Total (million kWh) | Sold to utilities[1] (million kWh) | (% of total) | Cogenerated[2] (million kWh) | (% of total) |
|---|---|---|---|---|---|
| 1982 | 34,243.0 | 668.3 | 2.0% | 27,843.6 | 81.3% |
| 1983 | 37,527.4 | 1,182.7 | 3.2 | 30,464.2 | 81.2 |
| 1984 | 40,043.7 | 2,493.2 | 6.2 | 33,780.2 | 84.4 |
| 1985 | 40,156.6 | 2,883.2 | 7.2 | 35,221.8 | 87.7 |
| 1986[3] | 11,001.0 | 1,023.3 | 9.3 | 9,694.2 | 88.1 |

1. Includes sales of gross electricity sold to public and private utilities.
2. Electricity generated by qualifying cogenerated facilities as defined by the FERC.
3. Figures for first-quarter 1986 only.
Source: American Paper Institute, Pulp, Materials & Technology Group.

To add insult to injury, the continuing decline of oil and gas prices means that utilities do not have to pay as much for cogenerated electricity. Still, it is in the paper industry's best interests to keep electricity costs as minimal as possible: its annual electricity bill is over $2 billion by the API's calculations. The paper industry is the third-largest purchaser of electricity among manufacturing industries in the U.S. ■

## EPA emission proposal threatens industry

Under the Environmental Protection Agency's proposed New Source Performance Standards, new industrial boilers that burn oil or coal and have a heat input of 100 million BTU or more would be required to reduce sulfur emissions by 90% from the current level. Also, overall emissions from new boilers would be limited to 1.2 lb sulfur/million BTU of heat input. The EPA estimates that industry contributes 1.5% of sulfur emissions in the country. Utilities, which account for the majority of sulfur emissions, would only have to lower emissions by 70% under the proposed law.

The proposed standards would require new boilers to have scrubber systems, which in some cases cost as much as the boiler itself. The scrubber systems could be avoided if the industry burned cleaner fuels, such as natural gas. However, natural gas is more expensive than coal or oil and is prohibited as a boiler fuel by the Fuel Use Act. (The Fuel Use Act may be repealed if H.R.4669, which passed the House recently, becomes law.) Observers say the new regulation would discourage investment in new boilers, keeping older, less-efficient boilers operating and aggravating the air pollution problem. Manufacturers and cogenerators will be hardest hit by the regulation. The EPA will issue final standards before Dec. 1. ■

## Acid rain bill could be costly—decision next year

According to the Council of Industrial Boiler Owners (CIBO), pending acid rain legislation could cost nonutility industries approximately $3.5 billion annually in boiler control costs and energy taxes. The House of Representatives is debating H.R.4567, a bill

feasibility of the paper mill. Another $500,000 could be made available to the county or municipality involved for support services such as sewers and roads.

This is not the first time interest has been expressed in kenaf newsprint, which would be competitive with woodpulp-based paper at current newsprint prices, Taylor said. The American Newspaper Publishers Assn. has been looking into kenaf as a woodpulp alternative for a number of years. The ANPA funded a study that determined kenaf growing and papermaking could be very practical for underdeveloped nations, with crops harvested two or three times a year. The plant thrives in tropical climates.

The crop would be a boon to Texan cotton growers, who have seen the price of cotton fall so low that it is not worth the cost of putting seeds in the ground, said Elaine Timmerman of the Texas Dept. of Agriculture.

**Earlier experimentation.** In 1979, six newspapers in different areas of the U.S. used a trial run of 40 tons of 97% kenaf pulp newsprint. Former owner of the *Yuma Sun* (Arizona) and current president of Western Newspapers Inc. and member of the ANPA technical committee on kenaf, Don Soldwedel, said that the Sun's participation in the trial (a 36-page, 18,000-newspaper run) was on newsprint lighter in color than the woodpulp product that the Sun was then using. That paper has resisted aging in the intervening seven years. In addition, the Sun's press run did not require a stop due to linting or breakage, although linting would have been a problem on a larger run, Soldwedel said. Last month's tests were partly designed to reduce linting.

In the 1950s, the U.S. Dept. of Agriculture made a survey of how many plants could be sources of newsprint pulp, and kenaf came out a top contender. Soldwedel does not expect kenaf to replace woodpulp but to supplement it. It could even be used in combination with woodpulp and recycled newsprint.

KI has been growing the kenaf crop for five years on 55 acres of a 15,000-acre farm in the south of Texas, said Delbert Langford, general manager of Rio Farms in Headcouch. The crop would need to bring in about $300 to $500/acre (harvested about every 130 days) to be profitable and competitive with the Canadian newsprint industry, Langford said. ■

*OUTLOOK*

## World paper/board demand to grow 2.6%/year

World paper demand is expected to rise to between 246 million and 255 million metric tons by 1995, according to a new study by the United Nations Food & Agricultural Organization (FAO). This represents an annual growth rate between 2.6% and 2.9% from the 1984 level of 187.3 million tons.

The projections are based on two world economic scenarios, one developed by the FAO and other U.N. agencies and another slightly less optimistic scenario from Chase Econometrics. Also, an Industry Working Party (IWP) made up of paper industry experts from 30 countries contributed to the study and developed its forecasts based on changing end use patterns, according to Irene Meister, vice president-international, American Paper Institute, who participated in the study.

In many cases, the IWP forecasts are more pessimistic than the projections based on the two economic scenarios. For example, IWP forecasts that paper and paperboard will reach only a 240-million-ton demand level in 1995.

The fastest growth in consumption is expected to take place in the developing countries, where growth in demand is projected to rise at around a 5% average annual rate through 1995, according to the FAO's *Outlook Study for Pulp & Paper Supply & Demand to 1995*. The growth rate in the developed market economies, however, is expected to be only a little better than 2%. The centrally planned economies are projected to show a growth rate of around 4% to 5% (with the highest rate in Asia and slower growth in the Soviet Union and eastern Europe).

*Outlook Study* projections for pulp indicate an increase in consumption from 1984's 140 million tons to between 177 and 181 million tons by 1995. However, the ratio of pulp content per ton of paper will decrease noticeably from 0.74 to 0.72. Wastepaper consumption will increase sharply from 49 million tons to between 83 and 85 million tons and will account for 32% of total worldwide fiber supply to the industry in 1995.

Average per capita consumption of paper and paperboard worldwide is projected to rise to 44 kg in 1995. This compares with 25 kg per capita in 1960 and 38 kg in 1984.

Total world printing/writing paper demand is projected to reach between 73.5 and 75.5 million tons in 1995. This represents an annual growth rate of between 4.2% and 4.7% from the 1984 level of 48.8 million tons. The IWP forecast is less optimistic at 67.7 million tons in 1995, reflecting such factors as slower growth in special interest magazines and increased electronic communication.

World newsprint consumption is

**Total world paper/board consumption projections to 1995 (million metric tons).**

| | Actual | FAO | | Chase | |
|---|---|---|---|---|---|
| **FAO regions, subregions** | **1984** | **1990** | **1995** | **1990** | **1995** |
| **Developed market economies** | **144.4** | **156.1** | **177.1** | **155.9** | **172.7** |
| North America | 73.4 | 76.1 | 82.6 | 78.3 | 84.6 |
| West Europe | 46.7 | 50.6 | 58.9 | 50.4 | 56.8 |
| Oceania | 2.5 | 2.8 | 3.2 | 2.9 | 3.3 |
| Others | 21.6 | 26.5 | 32.2 | 24.2 | 27.9 |
| **Developing market economies** | **20.1** | **27.9** | **37.0** | **28.5** | **34.7** |
| Africa | 0.8 | 1.1 | 1.4 | 1.1 | 1.3 |
| Latin America | 9.7 | 13.3 | 17.0 | 11.9 | 15.2 |
| Near East Africa | 0.4 | 0.7 | 0.9 | 0.6 | 0.7 |
| Near East Asia | 1.3 | 1.7 | 2.2 | 1.6 | 2.1 |
| Far East | 7.7 | 10.9 | 15.2 | 11.1 | 15.2 |
| **Centrally planned economies** | **22.8** | **31.8** | **40.6** | **31.5** | **38.5** |
| Asia | 7.5 | 12.1 | 16.2 | 14.5 | 20.0 |
| Europe, USSR | 15.2 | 19.7 | 24.4 | 16.9 | 18.4 |
| **World** | **187.3** | **215.9** | **254.8** | **214.0** | **245.9** |

Source: United Nations Food & Agricultural Organization's *Outlook Study*.

projected to reach between 39.3 and 39.7 million tons by 1995 under the Chase and FAO economic scenarios. This would reflect a 2.8% to 3.1% annual rate of growth from the 1984 level of 29.2 million tons. The IWP, however, forecasts total world demand at 36.4 million tons.

Other paper and board demand is projected to reach between 132.9 and 139.4 million tons by 1995, representing a 2.1% to 2.8% annual rate of growth. In this case, the IWP forecast is higher, at 141.2 million tons. Econometric forecasts for this broad category are more uncertain because it consists of unrelated grades such as tissue, containerboard, and packaging papers, according to Dr. Meister.

Where the data permitted, detailed analyses were performed in specific grade segments. Containerboard demand in the developed countries, for example, is projected by IWP to reach from 44.7 to 45.7 million tons, up from 32.1 million tons in 1981.

In the U.S., IWP forecasts containerboard consumption to reach 24 to 25 million tons by 1995, up from 17.3 million tons in 1981. European Community demand was to rise to 9.8 million tons from 7.1 million tons in 1981. Japanese consumption was estimated to reach 6.6 million tons in 1995 vs 4.6 million tons. ■

*CAPITAL SPENDING*

## U.S. paper companies lower 1986 capital spending sights

U.S. pulp and paper manufacturers will not reach the $9-billion mark in capital spending this year after all, according to a survey by the Commerce Dept.'s Bureau of Economic Analysis. The BEA's most recent survey, conducted in July and August, shows papermakers shaving spending plans back to $8.87 billion for 1986. This is still a new record but down 2.5% from the $9.1 billion reported in the earlier April/May survey (*P&P*, Sept., p. 33). The latest figure is very close to earlier estimates of $8.80 billion and $8.85 billion made in late 1985 and early 1986.

At $8.87 billion, 1986 capital outlays would show a 3.2% increase over the 1985 level of spending of $8.59 billion (revised upward from an earlier estimate of $8.53 billion). In contrast, paper industry outlays jumped 21.8% in 1984, to a total of $7.21 billion, and 19.2% in 1985. Spending is expected to drop sharply in 1987 and 1988, according to a recent McGraw-Hill survey of paper companies.

The pace of spending this year increased from an annual rate of $8.67 billion in the first quarter of 1986 to $9.02 billion in the second quarter of 1986, the Commerce Dept. estimates. The third-quarter pace was expected to drop off again to $8.71 billion before finishing the year at a pace of $9.07 billion in the fourth quarter of 1986.

In spite of the lower estimate, spending planned by the paper industry looks quite healthy when compared with most U.S. industries, especially in the manufacturing sector. The survey showed that downward revisions were widespread. Overall outlays are expected to decline 1.9% this year compared with 1985, led by a 6.2% decline in manufacturing. Spending by nondurable goods makers will fall 5.5% compared with last year. ■

*LABOR*

## Canadian IWA approves severing ties with U.S.

International Woodworkers of America delegates at an annual convention of Regional Council No. 1 in Nanaimo, B.C., voted to dissolve the international union by separating U.S. and Canadian groups. In addition, the IWA decided to pursue possible mergers with other Canadian unions.

The vote came at a time when the IWA is staging work stoppages at British Columbian sawmills to force the industry into a settlement. Only two pulp and paper mills have been directly affected, although others may be running low on woodchips.

Regional Council No. 1 of the IWA recently merged western and eastern Canadian locals into a group that now comprises 64% of the total 70,000 members in the international union. Now the same group wants to embrace such unions as the Canadian Paperworkers Union and the Pulp, Paper & Woodworkers of Canada—both represent workers mainly in the paper industry.

Meanwhile, a final vote on dissolution of the international union will be taken at the IWA's international convention this month.

Jack Munro, president of Regional Council No. 1, noted that the U.S. and Canadian IWA groups have had philosophical differences in recent years. The U.S. unions have negotiated concessions, which the Canadian workers have resisted. Most recently, U.S. workers at Weyerhaeuser Co., Willamette Industries Inc., and Boise Cascade Corp. voted for wage and benefit cuts in two-year contract settlements. Canadian workers are also unsettled about the threat of a U.S. countervailing duty on softwood lumber, which the U.S. locals reportedly support. ■

*DIAPERS*

## K-C countersues P&G over design of disposable diaper

Last fall, Procter & Gamble Co. sued Kimberly-Clark Corp. for allegedly infringing its patent for construction of Luvs diapers (*P&P*, Sept. 1985, p. 37). Now K-C is countersuing P&G for allegedly "unlawfully monopolizing the market for disposable diapers." K-C is also seeking to change its defense in the P&G suit because it has reportedly discovered new facts that would alter the case. The companies will meet in court next year.

The allegations concern the heat-shrinkable material that forms a portion of the diapers. Procter & Gamble maintains that K-C's Huggies brand diapers infringe a patent that P&G bought from Raychem Corp., Menlo Park, Calif.

Raychem invented a method of heat-shrinking the diaper material so that it retains its shape. P&G uses the process to construct Luvs' waistband, and it has sued K-C for using the material in the waistband of its Huggies diapers. P&G's suit seeks to prevent K-C from using the material and claims unspecified damages.

K-C is asking for triple damages, asserting that P&G's original patent is invalid and charging P&G with violating antitrust laws by trying to prevent effective competition in the disposable diaper market "at a time when P&G already had a dominant share of the disposable diaper market."

ISSUE FOCUS: CHEMICALS

# RECORD PAPER PRODUCTION BOOSTS CHEMICAL DEMAND—SPECIALTIES LEAD

## *P&P*'s chemical survey shows that pricing, supply are still favorable in many areas thanks to declining consumption in other industries

**By MICHAEL J. DUCEY, Technical Editor**

Pulp, paper, and paperboard production was strong through the first half of 1986, increasing 3.8%, 2.8%, and 4.9%, respectively, compared with the same period last year. Currently, there is no indication that rates will fall significantly in the latter portion of the year, putting 1986 near or above the record levels of 1984. Correspondingly, chemicals—commodity as well as specialty—will experience growth in consumption over 1985. Fewer equipment innovations that reduce chemical charges are evident, and installation of such equipment currently available has leveled off.

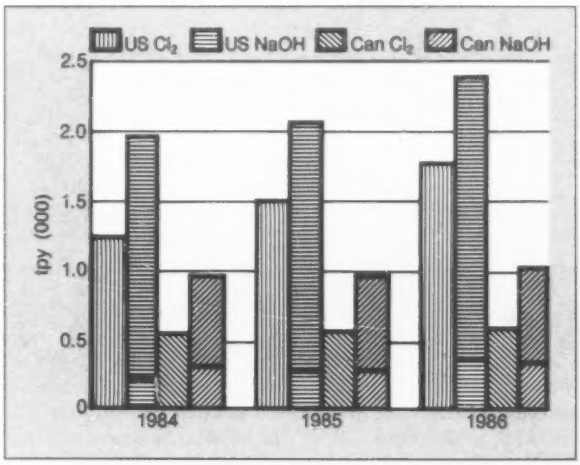
Prices have been climbing steadily. Sources of commodity chemicals have slimmed due to technological advances in production as well as an industry shakeout that began when prices fell in the beginning of the 1980s. The industry has accepted the price increases slowly, perhaps because prices of paper products have shown strength recently. Most commodity chemicals remain in oversupply, so demand will have to remain strong to hold prices. Suppliers report that the shakeout may continue since not all producers have scheduled modernizations that would help keep them at acceptable operating costs.

Consolidation of the paper industry and its suppliers is also reaching an unprecedented level. As a result, centralized buying and selling will prevail, and this probably is not very good news for suppliers. Suppliers are seeking diversified product lines, and the overall trend is to pursue production and sales of value-added products. Some of these products are customized, even on a commodity level, and acceptance has been strong for the suppliers who have experimented with this marketing strategy.

Chemical consumption has followed a general trend for a number of years: curtailment in pulp mills and increases in paper mills. Research, development, and implementation of equipment and chemical additions have favored this trend. In pulping, improved digester control, mixing technique, chemical input and production, recovery efficiency, and byproduct use have helped mills more efficiently use chemicals. In papermaking, alkaline sizing, forming enhancers, demand for coated stock and improved printability, and other research seeking higher consistencies for forming have placed greater emphasis on chemicals as a way to improve operations and product quality.

This survey consists of information on sources, industry capacity, mill demand, and current prices as well as commentary from this multibillion-dollar sector of the North American industry (one source estimates the value of mill purchases at close to $3.5 billion). Results from the U.S. and Canada have been combined since so many parallels exist in chemical consumption. All ma-

*FIGURE 1:* **North American chloralkali demand.**



jor chemicals and their chief suppliers are accounted for, as are many widely used but often overlooked chemicals. *P&P*'s sources for the survey include mills and suppliers, plus consulting firms and research institutions that track chemical consumption in the pulp and paper industry. All figures represent a combination of those sources, including estimates. *Pulp & Paper* invites comments on the material and its accuracy. ■

# PULPING CHEMICALS

## CHLORALKALI

North American industry chlorine capacity: 33,750 tpd. North American industry caustic soda capacity: 36,000 tpd.

**Sources:** Dow Chemical (4 plants), PPG Industries (2 plants), Olin (3 plants, plus a joint venture with Du Pont scheduled for startup in late 1987), Occidental (11, with the acquisition of Diamond Shamrock), LCP Chemicals (5 plants), Vulcan Chemicals (3 plants), Stauffer Chemical (3 plants), Pennwalt (3 plants), and C-I-L (3 plants). Those with one operating facility include Du Pont, Mobay Chemical, FMC, B.F. Goodrich, Formosa Plastics, Kaiser, and two papermakers: Weyerhaeuser Co. and Georgia-Pacific Corp.

**Supplier forecast:** Plant closures totaling some 8,000 tpd of chlorine and caustic over three years have trimmed supply, but the industry still sees itself in an overcapacity situation. Industry implementation of membrane cells, now operating at five sites in the U.S. (commercially at Taft, La., Tacoma, Wash., and Wichita, Kans.), reduces energy consumption by one-quarter or more compared with mercury or asbestos diaphragm cells, making it easier to exist in the marketplace. Experts forecast closures will amount to 500 to 1,000 tpd in the coming years. Having firmed in the second quarter, prices seem to be sticking at the $200/ton level for both products (depending on shipping point). Operating rates are said to be slightly under 90%.

**Mill demand forecast:** Consumption of chloralkali products is driven by the amount of chemical pulp that is produced and bleached. Innovative techniques in pulping and bleaching have not really affected chloralkali consumption since most installations are directed at more expensive chemicals or improved brightness. A few mills still produce chloralkali chemicals onsite (one plant was installed in late 1984), but chloralkali must be selling at a healthy price to justify the large capital expenditure needed to build such a plant.

## HYDROGEN PEROXIDE

North American industry demand: 9.5 million tpy.

**Sources:** Du Pont, FMC, and Interox have been dueling in the market for a long time. Each continues to try and outperform the others through expansions, modernizations, and new plant siting. Degussa is also planning to enter the North American market with a new plant in Alabama. Four locations in the U.S. currently produce hydrogen peroxide, while two are being constructed in Canada. Du Pont may start up its facility in Maitland, Ont., later this year, while FMC is still pondering the size of its new complex in Squamish, B.C.

**Supplier forecast:** Steady demand and stable energy costs have helped producers enjoy a healthy market. Bleached mechanical pulps will grow in importance, and hydogen peroxide will be a key factor in its development and implementation. Average estimates place hydrogen peroxide's growth above 10%/year, far above any other chemical involved in pulping. Prices have been steady, but pressure on the list (45¢/lb 70% solution technical grade) will be evident, especially if expansions in mechanical pulps and chemical pulps slow very appreciably.

**Mill demand forecast:** More than 30 bleached chemical pulp mills use hydrogen peroxide, and many more continue its addition on a trial basis. Users apply between 1 and 6 lb/ton of pulp, depending on the addition point and purpose. Mechanical pulp bleaching remains the real growth area, where processes call for applications of 1% to 2% and more (based on wood). New processes are being developed with peroxide as the main bleaching agent. An onsite hydrogen peroxide generator is being built in Thunder Bay, Ont., which could start a trend if it is successful.

## LIME

North American industry capacity: 23 million tpy.

**Sources:** Commercial lime is processed in 30 states by nearly 60 companies at more than 100 locations. Canada chips in another half dozen locations from three principal suppliers. Leading suppliers to the industry are Steel Bros. and Beachvilime in Canada, and Kerr-McGee, Dravo Lime, Mississippi Lime, Marblehead Lime, USG Industries, and many others in the U.S. Limestone is also available from most suppliers.

**Supplier forecast:** Use of lime in mills closely follows the production of kraft pulp, so growth will always be associated with new capacity. Wastewater treatment accounts for a fair portion of all consumption. Limestone

*FIGURE 2:* **North American hydrogen peroxide demand.**

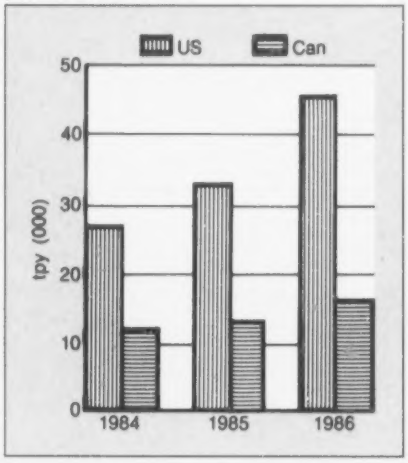



*FIGURE 3:* **North American lime demand.**

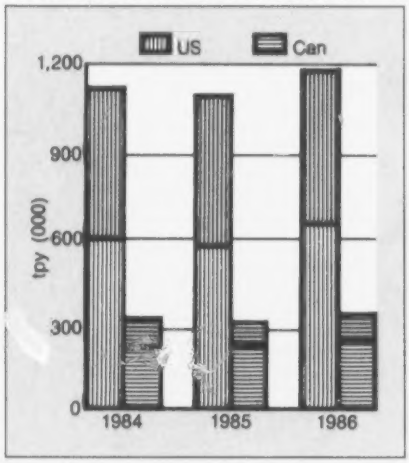
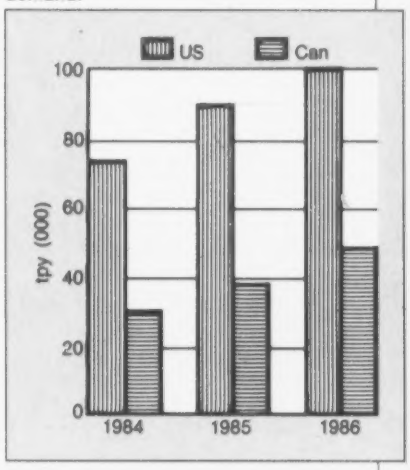



*FIGURE 4:* **North American oxygen demand.**




has not really threatened consumption trends since the feasibility of using it instead of other lime products usually diminishes when transportation, energy, and processing costs are considered. Prices will probably remain flat for a while, as the major user—the steel industry—continues in a state of flux.

**Mill demand forecast:** Kraft pulping is forecast to increase about 2%/year with announced expansions through 1990. No new greenfield mills such as the ones built in the early 1980s (Champion International Corp., Quinnesec, Mich.; Union Camp Corp., Eastover, S.C.; Leaf River Forest Products Inc., New Augusta, Miss., etc.) are planned. Water treatment areas (in both existing and new mills) have potential for increased consumption, particularly if environmental regulations continue to stiffen. Recovery systems currently regenerate 90% or more of all lime, so makeup lime accounts for all kraft pulp mill consumption—roughly 50% of the total consumed by the industry.

## OXYGEN

**Sources:** Five companies supply oxygen to pulp mills in the U.S., and four do so in Canada. Industry capacity is not really known since it is an air product and is sometimes referred to as a specialty gas (where swing production can occur).

**Mill demand forecast:** Oxygen's cost, application, and environmental benefits are being realized at more locations. It has found a home in bleacheries as both a substitution chemical and delignifier and as stopgap measure in lime kilns and pollution systems. Suppliers maintain that every bleaching system will eventually employ oxygen in some capacity. In lime kilns and pollution systems, oxygen will be used when small capacity increases occur and when environmental limits tighten until the mill can cure the problem with a major equipment purchase.

## SALTCAKE

North American industry production: 12 million tpy.

**Sources:** Many suppliers, such as Prior Chemicals, Ashland Chemical, and Allied are brokers, with the exception of Kerr-McGee, Saskatchewan Minerals, and Courtlands. Thus, each supplier has many producer points (in some cases over ten). Mills use a low-grade product that is available locally as one of the byproducts of industrial production.

**Supplier forecast:** For suppliers, pulp-grade saltcake consumption has been negatively impacted by a number of market influences lately. The supply is not expected to change from today's capacity, although mined saltcake has been declining for 15 years and synthetic production has been flat since 1980. Its "byproduct" stature has contributed to the curtailment in its production and use. Suppliers are adjusting to shifts in the market by introducing higher-quality products to stronger demand areas, such as detergent producers. Prices have stagnated in 1986 at $55/ton (list), with large discounts available in some areas.

**Mill demand forecast:** Competition from products such as emulsified sulfur and caustic, increasing (actually balanced) yields from chlorine dioxide plants, and better digester control with improved performance have curtailed saltcake use. Some saltcake is finding its way into chemimechanical operations, but growth there is uncertain and usage rates are not enough to offset past losses. The best estimates place a negative growth rate for saltcake at 3%/year.

## SODA ASH

North American industry capacity: 10.9 million tpy.

**Sources:** FMC, Henley (formerly Allied), Texasgulf, Stauffer Chemical/UPRR, and Tenneco all have plants operating in Wyoming. Kerr-McGee operates two facilities in California.

**Supplier forecast:** Operating rates for soda ash producers are low, as is demand by the pulp and paper sector and its number one consumer—glassmakers. Technological advances in soda ash production, namely solution mining, have occurred slowly due to a sluggish market and lack of capital. With the closure of a synthetic plant in Syracuse, N.Y., operating rates have risen (reportedly above 80%), and prices have been higher. Unfortunately, demand is stagnant now and is likely to be so in the future. The only relief is the export market, where growth is estimated at 5%/year through 1990. Adding to the woes of producers, one supplier prophesized that the market for boxboard products using corrugating medium, where soda ash is used in the production of neutral sulfite semichemical (NSSC) pulp, will slow down in the near future because of the realization of consumer debt and other economic factors that influence spending on big retail items.

**Mill demand forecast:** As sulfite pulping declines and kraft mills continue to use caustic for their sodium needs, it appears that soda ash consumption will be flat or perhaps even decline. The savior may be an unpalatable rise in the cost of caustic soda, opening up the possibility of using soda ash as the sodium source for pulping liquor.

## SODIUM CHLORATE

North American industry capacity: 550,000 tpy.

**Sources:** Six producers supply both liquid and dry product to chlorine dioxide generators—three of them have operations in the U.S. and Canada. The trend in production, like that of the chloralkali industry, is toward installing more cost-effective equipment. Metal anode cells have replaced graphite cells at two locations this year, and conversions at two other sites are slated to start up in 1987. Use of crystalline chlorate seems to have caught hold in the industry for economic reasons as well as usage flexibility.

**Supplier forecast:** The trade press has been quick to point out that a balance of supply and demand is at hand. As a result, price increases are beginning to emerge, although conflicting viewpoints have been heard on discounts. There should be an ample supply of chlorate throughout the decade. The shakeout of inefficient plants continues and consumption remains strong. Prices at the end of the first quarter fell more than $300/ton (crystalline), but at press time suppliers had boosted prices above $325/ton, still lower than the levels of the early 1980s.

**Mill demand forecast:** Chlorine dioxide is coming of age. Most bleached pulp mills are using it in the chlorination stage. Although mixed results in higher substitution use have been recorded, many still consider it for both quality and environmental purposes. Chlorine dioxide has also been used in papermaking systems for biocide treatment. Many mills are considering new systems since the average age of the generators is well over 20 years. Reports from abroad indicate chlorine use is detrimental to the environment, which could increasingly limit its use in favor of chlorine dioxide.

## SODIUM HYDROSULFIDE

North American industry capacity: 200,000 tpy (both low and high purity).

*FIGURE 5:* **North American saltcake demand.**

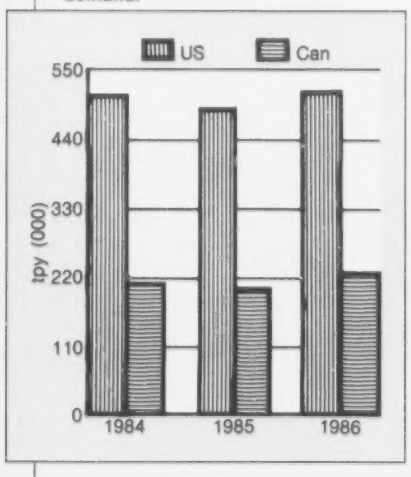



*FIGURE 6:* **North American soda ash demand.**

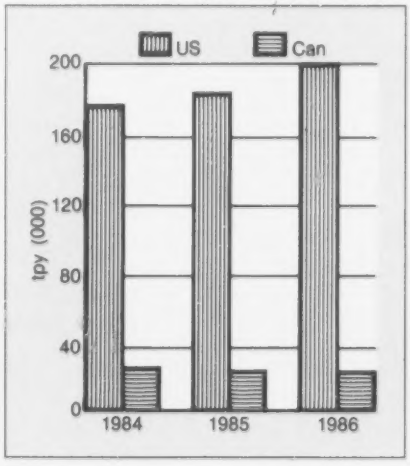
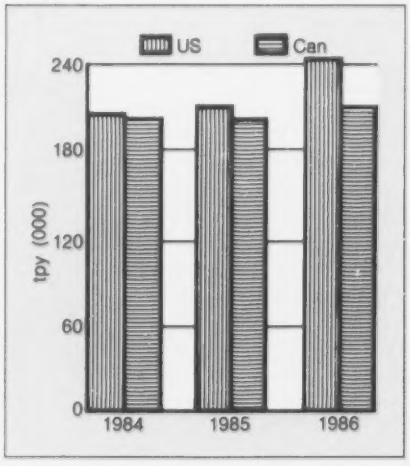



*FIGURE 7:* **North American sodium chlorate demand.**



**Sources:** Four companies produce high-purity product, which does not usually find its way into kraft pulping operations. Most pulp mills acquire their low-purity, low-strength product from small refineries, bromine producers, and other small operators who offer it as a byproduct.

**Supplier forecast:** Byproduct producers are somewhat elastic in the market, quite like crude tall oil producers in the pulp byproduct market. Slight shifts have occurred in high-purity production, and overall capacity stands at 45% of the total. Prices vary tremendously, but the top grade sells for $475/ton, with pulp mill purchases falling down to 50% of that for the low-grade products.

**Mill demand forecast:** Tied to kraft pulp production, consumption of sodium hydrosulfide has other possibilities for increased use. Cooking liquor containing essentially all sodium sulfide and cooking at 100% sulfidity has been tested successfully on a pilot level. In obtaining greater control over cooking, many mills have incorporated higher sulfidity levels, increasing strength and yield. Looking at current operations, consumption will probably be flat unless modifications are made, which would certainly be at a slow pace if at all.

## SODIUM HYDROSULFITE

North American industry capacity: 76,000 tpy, plus 15,000 tpy generated onsite.

**Sources:** Two producers, Olin and Virginia Chemicals, operate five plants in the U.S. providing site-ready sodium hydrosulfite. Ventron supplies a solution containing sodium borohydride, which reacts with sulfur dioxide for onsite production of sodium hydrosulfite.

**Supplier forecast:** About 21,000 tpy of product has been phased out in the last four years, with only 7,000 tpy being replaced. No changes are apparent in supply for the future, while availability continues to be fairly loose. Prices are near 78¢/gal, but discounting is prevalent because of soft markets in textiles and mechanical paper grades. Operating rates are said to be above 95%.

**Mill demand forecast:** With Canadians taking the lead, mills are moving away from sodium hydrosulfite and toward hydrogen peroxide for their bleaching needs. Higher brightness requirements are the chief reason for this. Very few new generators have been built for onsite production. Suppliers are responding by offering a more customized product with additives that will satisfy the mill's bleaching targets. Mills that currently use or generate sodium hydrosulfite will probably incorporate it into expanded projects, but it would be risky to predict that this will be the case for all new mechanical pulping lines.

## SULFUR

North American industry production: 16.34 million tpy.

**Sources:** Suppliers have been dwindling lately as supplies themselves dry up. Only two companies produce Frasch grades in the U.S., although several market grades are produced from recovery methods. A similar situation exists in Canada. Imports from Canada have also declined, perhaps due to Canada's falling deposits. The U.S.S.R. is expected to be the world's leading supplier in the next decade, with nations in the Middle East increasing their interest as well.

**Supplier forecast:** The supply of elemental sulfur is expected to be flat for 1986, while nonelemental sulfur supplies will drop for the second straight year. Prices have moved nicely over the past 30 months due to steady demand, decreasing supplies, and inflation. If the fertilizer industry picks up, prices could skyrocket.

**Mill demand forecast:** Sulfite pulping methods are being used less, with chemimechanical processes, wastepaper

*FIGURE 8:* **North American sodium hydrosulfide demand.**

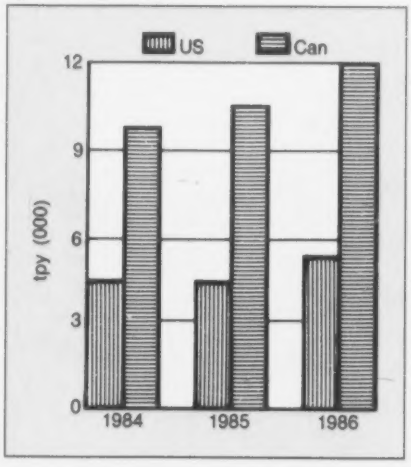



*FIGURE 9:* **North American sodium hydrosulfite/sodium borohydride demand.**

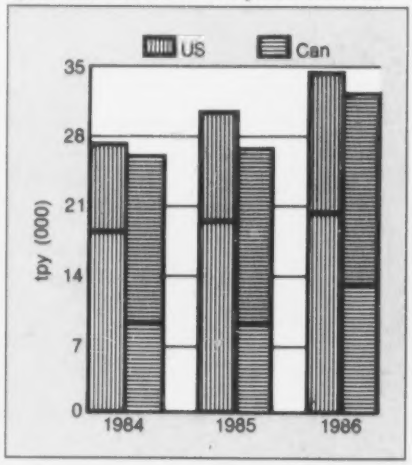



*FIGURE 10:* **North American sulfur demand, includes saltcake makeup use.**

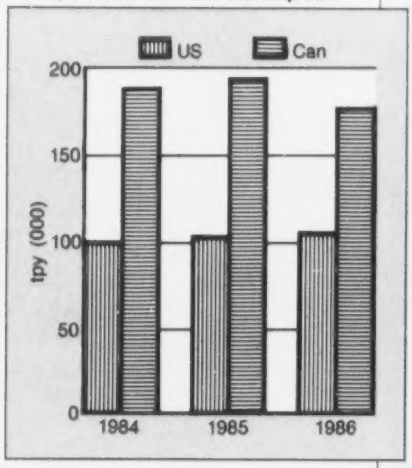


*FIGURE 11:* **North American sulfur dioxide demand.**

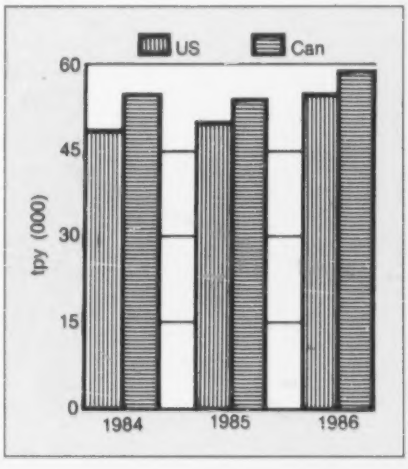
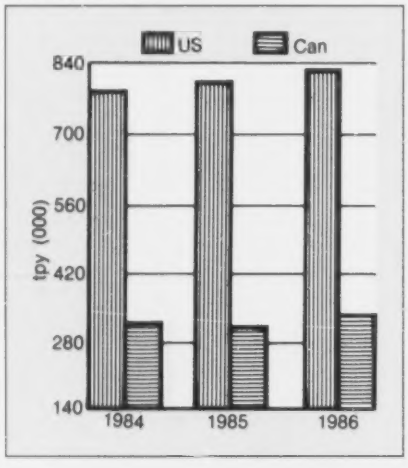



*FIGURE 12:* **North American sulfuric acid demand.**




## SULFURIC ACID

North American industry production: 40 million tons.

**Sources:** The U.S. has 76 producers, Canada adds another dozen. It is North America's largest chemical in terms of production. A few suppliers have expanded capacity in response to geographic or market needs, but no major shifts in sources are seen for the 1980s. A new source of sulfuric acid is being developed from phosgyp, a by-product of phosphate production, but a commercial-scale facility is still a few years away.

usage, and substitution chemicals all contributing to the demise. Environmental restrictions on discharges, particularly in Canada, have also helped reduce sulfite pulping output.

Newsprint makers continue to use sulfur in their furnishes, although at ever decreasing amounts. Elemental sulfur is making headway in use as a sulfur makeup chemical in kraft pulping. Emulsified sulfur products, with attractive prices and applicability, are becoming more accepted in the market.

## SULFUR DIOXIDE

North American industry capacity: 270,000 tpy.

**Sources:** Seven companies produce liquid product for commercial use at ten locations in the U.S. Two units have been closed down in three years, and no new capacity is scheduled for the near future.

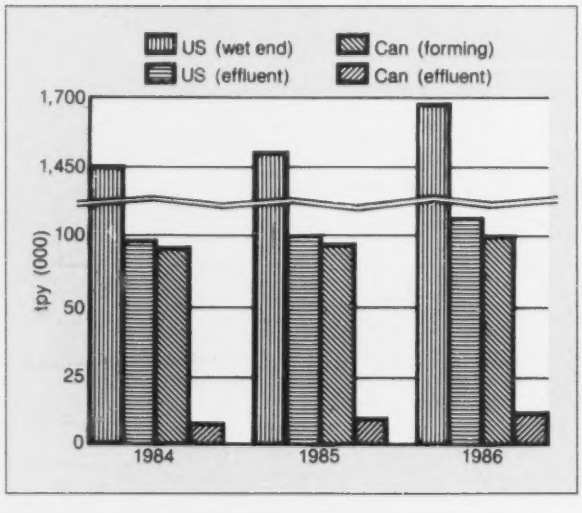
**Supplier forecast:** Balanced supply, particularly in the West, along with other industries' expanded use, should help firm pricing. Internal generation and consumption by some companies may impinge on that firmness. Another problem influencing price is the supply and cost of sulfur, which has been unsteady lately. The long-term outlook for prices is especially uncertain. Current list price for a bulk liquid shipment is around $200/ton, depending on location.

**Mill demand forecast:** Overall, consumption will be flat for many years, and it has been declining for the decade. Downward turns in sulfite pulp production, newer chlorine dioxide processes, and reduced use in chemical pulp bleaching have all contributed to this trend. A partial offset may occur in mechanical pulping operations and in other innovative or alternative sulfite pulping processes.

**Supplier forecast:** Like other commodity chemicals, sulfuric acid is having trouble in markets outside the pulp industry. Its use in fertilizer production is predicted to grow, but recent history dictates otherwise. Other markets such as mining, oil refining, and metal production are off too. Without demand strength in these areas, prices have been flat for two years and have dipped this year for both virgin and smelt products.

**Mill demand forecast:** Most sulfuric acid is used in the production of chlorine dioxide, with some being consumed in acid adjustment and washing. Projections differ on its direction in pulp mills, but if predictions for chlorine dioxide are accurate, growth will be steady. Its use in pulping and washing will likely remain constant.

*FIGURE 13:* **North American aluminum sulfate demand.**



# PAPERMAKING CHEMICALS

## ALUMINUM SULFATE

North American industry production: 3.2 million tpy.

**Sources:** There are a half dozen alum manufacturers in the U.S., and a few other companies deal for them also. In Canada, three producers operate in eight locations.

**Supplier forecast:** Alum suppliers see themselves in a declining market chiefly due to the downturn in use in water and wastewater treatment, where the majority of business is. Application in sizing and water treatment in papermaking is seen to be increasing as a function of expansion in the industry. Prices are flat or down in most areas, and no hikes are apparent for the future.

**Mill demand forecast:** Slow conversions to alkaline papermaking have helped stabilize papermakers' alum consumption. No changes in addition rates or the alum-to-rosin ratio have been seen, and some new wet end additives have actually increased alum additions incrementally (a few lb/ton). In water treatment, addition rates vary with water use and the amount of solids present in mill influent. Growth again will be tied with production, particularly in bleached grades and grades containing high filler and coating materials.

## CALCIUM CARBONATE

North American industry production: 1.425 million tpy (85% ground natural grades).

**Sources:** Six companies produce ground natural grades at 11 locations, while only two firms supply precipitated grades. There has been a lot of acquisition activity in this market, and no information is forthcoming on the motivation for it. No new capacity has been announced commercially, but some papermakers are installing their own onsite generators.

**Supplier forecast:** Attitudes on growth remain bullish. For both grades of calcium carbonate, the markets (paper, paint, plastics, rubber, etc.) all appear to be in good shape. Papermakers are switching to less-expensive ground natural, although roughly 70% of all product used is precipitated. Prices have been flat but firm for ground natural grades, while precipitated grades have experienced healthy gains.

**Mill demand forecast:** Papermakers are using more calcium carbonate in coating to achieve higher quality. Use as a filler is not moving significantly but is growing along with alkaline papermaking conversions. About 13% of the market is using this sizing method, which is expected to grow strongly over the long term. Many smaller machines (and smaller companies) have been quick to adopt the alkaline papermaking technique, but it is safe to assume that very few of the larger and qualified (uncoated free-sheet) machines will follow that lead over the near term. End users have been slow to accept these alkaline-sized products, but resistance is said to be softening.

A new trend in onsite generation of calcium carbonate is evident. Two locations in the U.S. are installing systems, bringing the worldwide total to five. The oldest, operating at American Israeli Paper Mills Ltd., has been providing versatile, quality products for over three years.

## CORNSTARCH

U.S. industry capacity: 3.23 million tpy.

**Sources:** Nine companies operate 21 plants across the U.S. (mostly in the Midwest), while Canada has four firms. New capacity has been brought onstream by National Starch & Chemical, which tripled capacity at one mill and is building a complex in North Kansas City, Mo. CPC completed a major modernization in Argo, Ill.

**Supplier forecast:** Overcapacity has always plagued producers. Some companies are enjoying spectacular success in other markets (food and soft drinks), but the paper industry has been a tough sell. In response, suppliers are offering diversified products for different applications. They are meeting with meaningful, albeit slow, success. Prices have not moved in years for the unmodified product, and no real increases are seen ahead.

**Mill demand forecast:** The newest push for application of cornstarchs is in the wet end of paper machines. Addition rates vary with grade, and opinions differ on whether those rates are rising. Acceptance has been slow but steady. Most papermakers would like to use it but need justification (like anything else). In coating and

*FIGURE 14:* **North American calcium carbonate demand, incorporates all uses.**

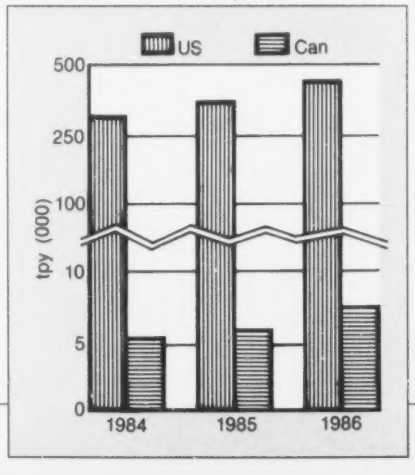
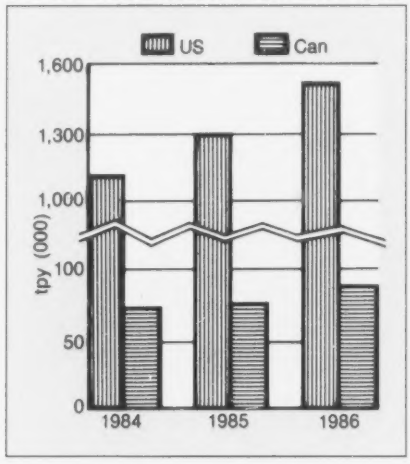


*FIGURE 15:* **North American starch demand.**

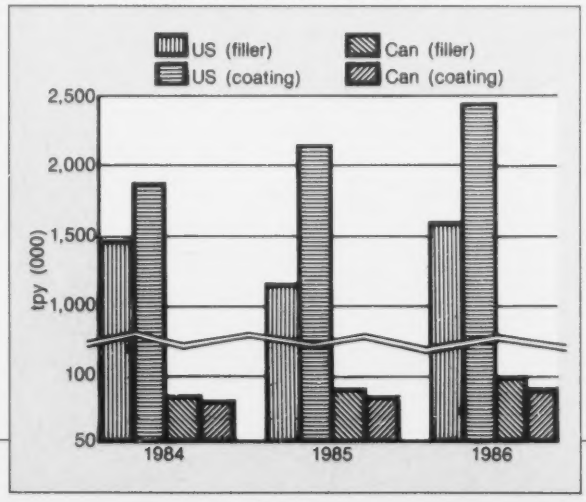



sizing operations, cornstarch has taken its lumps from polyvinyl alcohol (PVOH), styrene-butadiene latex, and protein, but its price competitiveness always ensures it of a strong place in the market. Formulations have not changed much in either area, and it does not appear that application in sizing or coating is vulnerable to equipment or other technological innovations.

**Potato starch.** A.E. Staley, among others, has introduced new starch products derived from potatoes that are targeted for use in alkaline papermaking systems. Mill information in this area has not been forthcoming, but one source mentioned that with conversion to alkaline papermaking, problems arise that do tend to offer opportunity for new additives.

The range of addition varies widely, but it has been revealed that fine paper makers will use between 5 and 20 lb/ton, linerboard uses from 40 to 60 lb/ton, and groundwood papermakers under 5 lb/ton. The results across a variety of grades have shown improvements in Scott bond, fold, stiffness, runability, and other important strength properties.

*FIGURE 16:* **North American kaolin clay demand.**




## KAOLIN

North American industry production: 10.4 million tpy (27% for export).

**Sources:** Seven companies mine and manufacture kaolin clay products at 14 locations supplying the paper industry. The majority of papermaking clay comes from the state of Georgia. A few suppliers have increased capacity in the last three years, seemingly to keep pace with ever-growing demand for this effective inorganic filler and coating material.

**Supplier forecast:** Expanded product lines and increased service are the focal points for kaolin suppliers. Demand is strong for most grades, although value-added products are receiving a lot of attention because of the upward shifts in paper quality. Pricing is tougher to follow since the emergence of the new products, but it is safe to assume increases for all grades should average around 5% for 1987. Higher price boosts for the top clays are probable, particularly if demand for them continues to be as strong as it has been.

**Mill demand forecast:** Kaolin is one of the few chemicals to maintain demand increases even in tough market and economic situations. Its price, availability, and versatility make it attractive at all times. Use in coating formulations (where it makes up, on average, at least 60% of the components) is stable. Alkaline papermaking conversions have not changed consumption patterns appreciably, although kaolin will continue to be challenged as a filler material. With growth forecasts for coated paper and printing and writing grades still bullish, kaolin clay should maintain a growth rate above 4%/year through 1990. Another factor supporting these claims is the tight supply of titanium dioxide, where top-quality kaolin is used as an extender and opacity stabilizer.

## POLYVINYL ALCOHOL

North American industry capacity: 120,000 tpy.

**Sources:** Du Pont and Air Products operate plants in the U.S. Monsanto dropped out of the market at the end of last year, and its 9,000-tpy plant remains idle. No new capacity has been announced for the future.

**Supplier forecast:** Polyvinyl alcohol (PVOH) consumption is usually associated with the textile market, but since that has declined, other more favorable areas have emerged, such as adhesives and paperboard. As a result, demand will be flat. The fully hydrolized product used by the paper industry is near record level prices at $1.00/lb, but discounting is evident. Price and demand will probably follow GNP cycles through the 1980s.

**Mill demand forecast:** As market forces for higher-quality paper and paperboard products drive demand, the use of PVOH will increase. PVOH is seen as a superior adhesive, binder, and surface-sizing material with and

without starch. Together with its strength as a barrier and grease resister, papermakers feel its use and price can often be justified because it outperforms other materials used in these applications. However, problems in rheology, usually in makedown and delivery, are still a concern in switching to PVOH.

## STYRENE-BUTADIENE LATEX

North American industry production: 415,000 tpy.

**Sources:** The majority of product shipped to the paper industry is shared by four companies, although as many as six more claim 20% of the market. Two of the four operate wholly owned subsidiaries in Canada. Expansion is difficult to track due to the secrecy of the suppliers, but since demand has climbed in the 1980s, supply has been adjusted accordingly.

**Supplier forecast:** Companies are pushing their products on this market like never before, mostly because of the pressure put on papermakers from end users for high runability and printability. As a result, growth forecasts, usually associated with coated paper capacity and price fluctuations, now hinge on every printing style in the market. Prices have edged up over time, but increases will probably surpass inflation should demand projections be realized.

**Mill demand forecast:** As the trend for higher-quality printing surfaces continues, coating formulations increase the amount of S-B latex, and some even use it exclusively. Coated paper capacity will grow 4% this year and 8% in 1987. Imports have hampered the market in the 1980s, but the falling dollar may offer some relief. Coated paper capacity increases abroad will really pressure prices later in the decade, which could drop operating rates and curtail the use of coating materials.

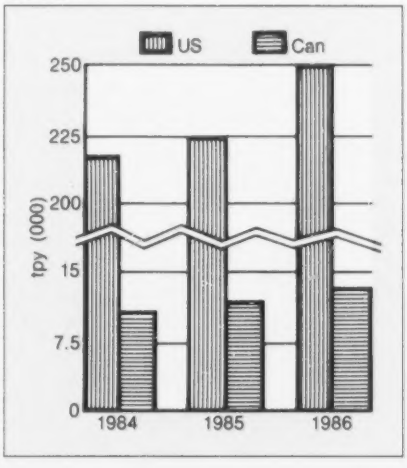
## TITANIUM DIOXIDE

North American industry capacity: 950,000 tpy.

**Sources:** Four companies operate facilities in eight locations in the U.S., and there are two suppliers in Canada. About 25% of U.S. domestic supply has been cut in five years due to environmental problems encountered in processing. A few U.S. suppliers have announced plant construction offshore, so imports should continue the upward climb that began at the end of 1985.

**Supplier forecast:** Tightness in the market will persist unless the economy slumps. Announced domestic and offshore expansion will not be available until the end of the decade, so worldwide supply will be tight as well. The major end users are coatings (50%), paper (25%), and plastics (12%). They are all in a growth phase. Prices are firm and at an all-time high for all grades. Prices will increase next year, but opinions on the extent differ widely among suppliers. Operating rates are over 93%.

*FIGURE 17:* **North American titanium dioxide demand.**




**Mill demand forecast:** Value-added products are in vogue for all industries, and the paper industry is no exception. This trend favors titanium dioxide consumption since it offers the maker higher quality opportunities than other filler and coating materials. Consumption per machine is increasing as are the number of machines using the product. Paperboard and uncoated printing and writing grades will be big users in the near term. If coated paper demand picks up due to increased advertising or media events such as elections or the Olympic games, titanium dioxide's future will brighten.

## OTHER CHEMICALS

Table 1 lists other major chemicals used in the industry. All of them will follow the growth trends associated with their application, with defoamers and surfactants reaping the biggest gains. Synthetic sizes have not been included, although they represent some 15,000 tpy and will covet the alkaline papermaking and recycled newsprint expansions. Biocide consumption is also rising because of concerns for quality and paper machine runability. Dye use continues to climb as demand increases for colored paper across all grades.

Retention and drainage aids, wet and dry strength additives, and felt washing and conditioners represent $250 million worth of purchases. As more chemicals and less fiber are used in papermaking systems, their consumption is sure to increase. ■

*TABLE 1:* **Other materials (total North American demand).**

| | PVOH | PVAc | Rosin | Defoamer | Surfactants |
|---|---|---|---|---|---|
| 1984 | 6.2 | 76 | 159 | 42 | 15 |
| 1985 | 9.8 | 79 | 166 | 48 | 18.5 |
| 1986 | 10.1 | 85 | 169 | 59 | 22 |